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SUBJECT: SINGAPORE PUSHING R&D AND POACHING TALENT

¶1. (SBU) SUMMARY: The Government of Singapore (GOS) aims to grow research and development (R&D) spending to three percent of its gross domestic product (GDP) by 2010. GOS agencies advocate a results-driven and integrative approach to R&D in order to expand the local economy and involve foreign researchers in developing local talent. Prominent Singaporeans in charge of a multi-billion dollar fund run by the Prime Minister's office actively seek and hire foreign scientists, researchers and academics to develop Singapore's R&D, education, and commercial capabilities in areas such as life sciences, clean technologies, and digital and interactive media. Scientists that have relocated here attribute Singapore's success in luring talent to: visible government commitment to and understanding of sciences; generous funding; freedom to develop projects with minimal administrative burdens; and Singapore's strategic location in Asia. Compared to the complexities involved in conducting research in the United States, Singapore's small size and supportive environment have created what some have called a "scientific oasis," that has attracted many U.S. scientists. Still, Singapore has its work cut out to develop the local talent and entrepreneurship required to anchor R&D here longer term.

GOS Increasing Public Spending on R&D

¶2. (SBU) The GOS aims to increase overall R&D spending from 2.3 to 3 percent of GDP by 2010 by investing and attracting foreign investment in three core areas: life sciences, clean technologies (e.g., water and energy technologies), and digital and interactive media. Several GOS agencies are tasked with attracting investment and talent, including the Agency for Science, Technology and Research (A*Star), the Economic Development Board (EDB), the Ministry of Education, and the National Research Foundation (NRF), which is a multi-billion dollar fund established in 2006 within the Prime Minister's office. Each agency has a slightly different role, but all are focused on bringing companies, institutions and higher-value jobs to Singapore and using foreign money and talent to build up local capabilities in R&D. To spur this process, the GOS plans to double the public R&D budget from S\$5 billion (US\$3.47 billion) in 2005 to S\$13.55 billion (US\$9.4 billion) in 2010. It has allotted S\$5 billion to NRF, S\$5.4 billion (US\$3.75 billion) to A*Star, S\$1.05 billion (US\$730 million) for academic research, and S\$2.1 billion (US\$1.46 billion) to promote private sector R&D, according to NRF.

Results Driven, Integrative Approach

¶3. (SBU) Singapore emphasizes industry focused R&D, commercialization of R&D and local talent development, rather than more theoretical, "blue sky" projects, Prof. CHONG Tow Chong, Executive Director of A*Star said in a recent presentation to the American Chamber of Commerce. For example, small local technology-intensive companies can

upgrade capabilities and expand export potential by working with one of A*Star's research institutes, which can include seconding scientists to the local company, and tapping International Enterprise (IE) Singapore to help with export promotion under A*Star's "GET-Up" and "T-Up" programs. A*Star's Science and Engineering Research Council (SERC) coordinates and helps fund an aerospace technology consortium that includes sixteen members (e.g., Boeing, Pratt & Whitney and Rolls Royce) and emphasizes R&D relevant to the aerospace industry such as developing erosion resistant coating for airframes. U.S. scientist, Kerry Sieh, the Director and Professor at the Earth Observatory of Singapore, told Emboffs that in addition to the research he is doing in Singapore, he has been asked to work with MOE to create an earth sciences curriculum for secondary-school students here.

¶4. (SBU) The GOS has underwritten certain R&D initiatives, such as biotechnology projects, an approach that differs from that taken by the United States government. In the United States, National Institutes of Health (NIH) ethics rules require extensive documentation of meetings that NIH researchers have with private sector businesses, and the rules limit collaboration and the amount of compensation that NIH scientists can receive for consulting with private industry, a visiting NIH researcher told Poloff. In comparison, the GOS encourages and subsidizes scientists who wish to convert their discovery into real income, he said. Registering a business in Singapore can take as little as fifteen minutes via an online process. Scientists in biotechnology fields can apply for a three-year sabbatical, which includes a US\$100,000 per annum stipend to launch new business ventures, the NIH researcher continued. Clinical

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trials are often approved within three weeks. New biotech manufacturing businesses can draw on GOS subsidies to build new manufacturing facilities and can be operating within 24-36 months of initiation, according to the EDB's Web site.

¶5. (SBU) Agencies like A*Star and EDB advocate an integrative and cost-efficient research model that is enabled by collocating multi-disciplinary facilities. Scientists gain from having access to counterparts in a range of science and technology fields that can combine on projects (e.g., biology and nanotechnology), and investors enjoy reduced capital expenditures because multiple companies or institutions can share access to expensive equipment. Singapore built Biopolis in 2003, a US\$365 million, seven-building life sciences complex containing five research institutes: the Bioinformatics Institute, The Bioprocessing Technology Institute, the Genome Institute of Singapore, the Institute of Molecular and Cell Biology, and the Institute of Bioengineering and Nanotechnology. Nearby, in 2008, the GOS opened Fusionopolis, a similarly ambitious complex for research in materials science, engineering data storage, microelectronics, manufacturing technology, high performance computing, and information and communications. A*Star also organizes R&D priorities thematically in areas such as: sustainable development; health and wellness; mega-cities; and high-value manufacturing.

Prominent Singaporeans Court Prominent R&D Talent

¶6. (SBU) Singaporeans at the highest levels of government and business have a hand in realizing Singapore's R&D vision. Alongside the NRF, the Prime Minister chairs the Research, Innovation and Enterprise Council (RIEC), which is tasked with advising the Singapore Cabinet on R&D policies and facilitating the transformation of Singapore to a knowledge-based economy. RIEC members include: Dr. Tony Tan, NRF Chairman and Deputy Chairman of Singapore sovereign wealth fund Government Investment Corporation (GIC); Deputy Prime Minister and Minister for Defense Teo Chee Hean; the Ministers for Finance, Trade and Industry, and Health; as well as private sector leaders from Harvard Business School,

Stanford University, and DBS Bank. Philip Yeo, the former chairman of A*STAR and EDB was famous for poaching U.S. scientists, but now others like Tony Tan have taken up the mantle to personally recruit global science and technology talent using multi-million dollar NRF grants and assurances of limited GOS interference in their projects. Scientists remarked to Emboffs that they were impressed with the caliber of GOS officials they met during initial discussions about Singapore and said that kind of GOS access and support motivated the scientists to relocate here.

Personal Networks Also Key

¶7. (SBU) Many other scientists are lured to Singapore through personal connections resulting from collaborative work and scientific conferences hosted here. Biomedical scientists from Novartis working in Singapore told Poloff that they learned of research opportunities in Singapore through existing collaborative relationships between Singapore institutions and U.S. universities and government agencies (e.g., NIH and the National Science Foundation (NSF)). When the scientists traveled to Singapore for conferences or consultations, they were offered lucrative positions based on the recommendations of the local scientists or institutions. Singapore played host for the second time this summer to U.S. graduate students participating in the NSF East Asia and Pacific Summer Institutes program, and at the opening ceremony the local university faculty made a strong pitch for the U.S. students to consider moving to Singapore for post-graduate work.

The GOS Shows Scientists the Money and Commitment

¶8. (SBU) Financial incentives for scientists moving to Singapore can be substantial. An NIH scientist told Poloff that he has been approached approximately 12 times with job offers in Singapore's biotechnology industry. The salary offers have ranged from two to four times his annual US\$150,000 salary at NIH and included an annual 25 percent bonus, housing and dependent child educational subsidies, he said. Other U.S. scientists based in Singapore confirmed that the salary scale in Singapore is considered generous. An assistant professor can earn from US\$61-105,000; associate professors earn US\$94-177,000; and full professors earn US\$155-234,000. Singapore will also fund scientists on a contract basis, sparing them the regular grant-writing

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process necessary in other countries. A local scientist told Poloff that contracts can be as long as five to ten years. Each scientists' work is reviewed by an A*Star committee every six months to confirm funded work is productive. Unproductive contracts are canceled.

¶9. (SBU) Beyond the financial benefits of moving to Singapore, scientists cited the very visible GOS commitment to science and technology and R&D. Singapore is a smaller, less competitive environment than the United States. Top experts in their fields are brought to Singapore to pioneer new R&D projects, university departments, and curriculum, Kerry Sieh told Emboffs. The timeline for having projects approved can be dramatically shorter than in more mature and complex markets like the United States. Sieh said that when he was in talks with the GOS to develop the Earth Observatory of Singapore, MOE actually developed the first draft of his proposal, anticipating how the GOS might like the Observatory to function. Sieh said that about 70 percent of the initial proposal from MOE was "right on," so he only had to make revisions and fill in the other 30 percent, saving him time and effort. The proposal was approved in less than six months. Sieh said a comparable project in the United States could take several years and require a very competitive and labor-intensive grant-proposal process.

¶10. (SBU) In addition to the GOS investment, infrastructure and support for R&D, Singapore is exploiting its other advantages. Singapore has had more permissive stem cell research regulations than the United States. Human embryonic stem cells can be obtained from surplus embryos produced for fertility treatments in Singapore. Human embryos can also be created for research purposes and kept up to 14 days, the point where the embryos start forming tissues and organs. Foreign scientists also remarked to Poloff that visa and immigration issues in the United States drove them to Singapore. An Indian scientist who worked for five years at NIH told Poloff that he waited four months for his H1B1 visa renewal in India and decided instead to come to Singapore. A Chinese-born scientist told Poloff, "Tell your people in Washington that I wanted to be American, but the United States didn't want me. Instead, now I bring my talents to Singapore." Intellectual property (IP) protections are also key to encouraging multinationals to conduct R&D here. Relative to its neighbors, Singapore's patent protection regime is strong. However, some questions remain about patent ownership in certain scenarios. When A*Star seconds scientists to local companies, the local company would own IP generated from the collaboration, A*Star's Chong said. Other scientists said that in cases where scientists are funded by the GOS, the scientists split patent royalties with the GOS, usually on a 50/50 basis.

A Foreign Scientist's Oasis, but Work to do Locally

¶11. (SBU) Singapore aims to establish itself as a science and technology hub for the region, mostly by bringing in foreign researchers and institutions that locate here for the access Singapore provides to the rest of Asia. Duke University and the National University of Singapore (NUS) collaborate in Singapore on emerging infectious disease research because much of the global population growth and urbanization is happening in Asia, Duane Gubler, Director for the Program on Emerging and Infectious Disease at Duke-NUS Medical School, told Emboffs. Kerry Sieh noted that he valued the opportunity Singapore provided to build an earth sciences program from the ground up in Singapore that also reaches students studying here from Indonesia, Malaysia and India. Foreign scientists have said Singapore is like a science and technology oasis in the region in terms of the local funding available and the economic opportunities Asia represents for future commercialization of technologies. However, local talent still has to catch up. At the Earth Observatory of Singapore, all of the administrative staff is Singaporean, but almost all of the researchers are foreign, Sieh noted. A*Star's Chong deduced, based on Singapore's annual birth rate of approximately 35,000, that only 700 of those born annually are likely to go on to study at the very top global universities. Out of that only a small number would enter science and technology fields. Therefore, it will be several more years before Singapore has sufficient local talent to anchor R&D here longer term.

¶12. (SBU) A*Star's former chairman, Philip Yeo was instrumental in building Singapore's biomedical sector and Yeo now heads Spring Singapore, the local equivalent to the

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U.S. Small Business Administration. While Singapore has been very successful in luring foreign scientists and corporations to its soil and providing fertile ground for R&D, it has been far less able to incubate and develop new local companies. Singapore is not a hotbed for entrepreneurship or venture capital. Failure is still seen as a career-ender and not a step on the way to developing a successful business. The challenge in results-driven Singapore is to produce new small businesses and create jobs. Given Singapore's aversion to failure and reliance on government-led business initiatives,

Philip Yeo and Spring Singapore have their work cut out developing local R&D that can result in thriving Singaporean companies.

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